2

ENVIRONMENTAL RESEARCH INSTITUTE OF MICHIGAN
FORMERLY WILLOW RUN LABORATORIES, THE UNIVERSITY OF MICHIGAN
P. O. BOX 618 • ANN ARBOR • MICHIGAN • 48107
PHONE (313) 483-0500

18 June 1973

Report No. 102200-3-L

National Aeronautics and Space Administration
Johnson Space Center
Prinicipal Investigator Management Office
Mail Code TF6
Houston, Texas 77058

Attention: Mr. Zack H. Byrns

Contract: NAS9-13279

Subject: First Quarterly Report for Period 8 March 1973 Through 8 June 1973

Dear Sir:

The following is the first quarterly report for this contract entitled, "Determination of the Earth's Aerosol Albedo Using Skylab Data." Described herein are the procedures conducted on this contract prior to and during the launch phase of SL-1 and SL-2. Also, accomplishments expected during the next reporting period are noted.

Work on this contract is performed in the Infrared and Optics Division directed by Mr. Richard R. Legault. Dr. Robert E. Turner is the Principal Investigator for this contract.

The basic objective of this task is to determine the Earth's aerosol albedo using Skylab data. Albedo is defined as the ratio of the output power to the input power for a given medium. By selecting specific regions on the Earth's surface which have low surface reflectances one can estimate the amount of energy being reflected by the air mass over those regions using Skylab S-192 multispectral data. From a knowledge of the composition of the air mass as obtained from aircraft data and weather records one can calculate the relevant optical parameters to be used in a radiative-transfer program to calculate the radiation at the spacecraft. Thus, a direct comparison can be made between Skylab data and theoretical models.

During this reporting period a thorough definition of the aircraft flight lines was made. Discussions were held with Mr. J. Weber of NASA concerning the C-130 aircraft flight over the western test site at Pisgah Crater, California and with Mr. P. Hasell of ERIM concerning the ERIM C-47 aircraft over Lake Michigan. The C-47 aircraft has been outfitted with an integrating nephelometer produced by Meteorology, Inc. of Altadena, California. This device measures the volume extinction coefficient parameter to be used in the analytical part of the investigation. Information

ENVIRONMENTAL RESEARCH INSTITUTE OF MICHIGAN
FORMERLY WILLOW RUN LABORATORIES, THE UNIVERSITY OF MICHIGAN
P. O. BOX 618 • ANN ARBOR • MICHIGAN • 48107
PHONE (313) 483-0500

regarding ground truth for the sites under consideration was obtained from a geophysicist with previous access to these areas.

As a result of a number of problems associated with Skylab-2 no data were collected for either of the test sites under consideration. Hence, in communications with NASA it was decided that the same data collection plan for SL-2 now should be shifted to SL-3. Because of these delays little time was charged to this contract during this reporting period.

During the next reporting period it is expected that SL-3 data will be collected. Hence, weather records will be available for the sites under investigation and preliminary analysis using the radiative-transfer model can be carried out. Also, intercomparisons between computational techniques will be done for an error study.

A summary for the remaining effort to be performed is as follows:

1. Perform preliminary calculations using the radiative-transfer model to simulate conditions at the test sites.

2. Analyze data tapes from aircraft and from Skylab to estimate spectral radiance from the atmosphere at test sites.

3. Obtain auxiliary data from C-47 aircraft on the atmospheric optical parameters and calculate the optical thickness of the atmosphere.

4. Extrapolate aircraft multispectral data to spacecraft altitude and compare with Skylab data.

5. Run radiative-transfer model calculations and compare with aircraft and Skylab data.

6. Write technical report and publish paper on results.

No travel has taken place under this contract to date.

Submitted By: Robert E. Turner

Robert E. Turner
Principal Investigator

Approved by: F. J. Thomson for

Richard R. Legault, Director
Infrared and Optics Division

RET:rmc